



# UNITED STATES PATENT AND TRADEMARK OFFICE

H.A  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,195	03/29/2001	Xiao-An Zhang	10010538-1	1230

7590 07/25/2006

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER
----------

EVERHART, CARIDAD

ART UNIT	PAPER NUMBER
----------	--------------

2891

DATE MAILED: 07/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/823,195	<b>Applicant(s)</b> ZHANG ET AL.	
	<b>Examiner</b> Caridad M. Everhart	<b>Art Unit</b> 2891	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 11, 12, 15, 16, 18-23, 26-28, 31, 32, 35, 36 and 38-40 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 9, 10, 13, 14, 17, 24, 25, 29, 30, 33, 34, 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

### Response to Arguments

Applicant's arguments with respect to claims 1-3,6-8,11,12,15,16,18-23,26-28,31,32,35,36, and 38-40 have been considered but are moot in view of the new ground(s) of rejection.

Applicant has amended the claims to include the limitation of "non-redox" and of "an intramolecular" change.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3,6-8,11,12,15,16,18-23,26-28,31,32,35,36,38-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Kergueris, et al (Physical Review B Vol. 59, No. 19, 15 May 1999, pp. 12505-12513.)

Kergueris et al disclose a molecular switch(p. 12506, Fig. 1 and Abstract, p. 12505, which discloses the molecule is a switch). The molecule acts as a switch between two electrode gold wires(Fig. 1). The molecule has different energy levels which are related to the molecular electronic levels determined by charge displacement within the molecule, so that the mechanism is an intramolecular effect(p. 12508, bottom 4 lines of first column and top 5 lines of second column). The delocalization of the

molecular orbitals and the change in the electron energy levels is a mechanism of change in the molecular orbital conformations. It can be seen from the conjugated pi bonds in Fig. 1 that the molecule would have delocalization of the electrons. With the changes in the overlap of orbitals which occurs with the intramolecular transfer of electrons there would be changes in the stretching and the rotational properties of the molecules. The different energy levels are indicating the differences in the overlap of the molecular orbitals, which indicate differences in the geometry and the possible rotation and stretching modes.

Claims 1-3,6-8,11,12,15,16,18-23,26-28,31,32,35,36,38-40 are rejected under 35 U.S.C. 102(b) as being anticipated by McCreery(US2004/0190429A1).

McCreery discloses a molecular switch(paragraph 0044 and Fig. 1) which has delocalization of electrons(paragraph 0015) and conjugated bonding(paragraph 0009). The molecule has different energy levels which are utilized in the switching mechanism(Fig. 3E) and are a result of the conjugated bonding. The change in molecular orbital levels is changed which reflects changes in the molecular orbital conformation. There is a lowest and a highest energy level, so that there is an energy minimum and maximum(paragraphs 0040, 0046, and Fig. 11B). The molecules are between electrodes as shown in Fig. 13(paragraph 0110).

The delocalization of the molecular orbitals and the change in the electron energy levels is a mechanism of change in the molecular orbital conformations. It can be seen from the conjugated pi bonds in Fig. 1 that the molecule would have delocalization of

the electrons. With the changes in the overlap of orbitals which occurs with the intramolecular transfer of electrons there would be changes in the stretching and the rotational properties of the molecules. The different energy levels are indicating the differences in the overlap of the molecular orbitals, which indicate differences in the geometry and the possible rotation and stretching modes.

***Claim Rejections - 35 USC § 103***

Claims 1-3,6-8,11,12,15,16,18-23,26-28,31,32,35,36,38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou, et al (Appl. Phys. Lett. 71(5), 4 Aug. 1997, pp. 611-613).

Zhou, et al disclose a molecule in which there is conjugation, as there are conjugated double bonds in the aromatic rings and electron delocalization(Fig. 1). The molecules may be used as molecular switches as well as the described use as rectifiers, since there is a disclosure that electron transfer occurs within the molecules, and one of ordinary skill in the art would be able to therefore use the molecules as switches as well as rectifiers (p. 611, Fig. 1 and first column of page 613 in which electron hopping mechanism is described). The mechanism which results in the change in molecular energy levels is a mechanism of change in molecular orbital conformation. In the figure it can be seen that the molecules are between electrodes. The delocalization of the molecular orbitals and the change in the electron energy levels is a mechanism of change in the molecular orbital conformations. It can be seen from

the conjugated pi bonds in Fig. 1 that the molecule would have delocalization of the electrons. With the changes in the overlap of orbitals which occurs with the intramolecular transfer of electrons there would be changes in the stretching and the rotational properties of the molecules. The different energy levels are indicating the differences in the overlap of the molecular orbitals, which indicate differences in the geometry and the possible rotation and stretching modes.

Zhou et al is silent with respect to a switch.

It would have been obvious to one of ordinary skill in the art at the time of the invention that the molecule disclosed by Zhou et al can be used as a molecular switch because the disclosure of Zhou et al discloses the molecule has rectifier properties, and these same properties can be used in a switch by one of ordinary skill in the art.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
CARIDAD EVERHART  
PRIMARY EXAMINER

C. Everhart  
7-20-2006